



WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY
601 57th Street, SE
Charleston, WV 25304
Phone: (304) 926-0475
www.dep.wv.gov/daq

**PERMIT DETERMINATION FORM
(PDF)**

FOR AGENCY USE ONLY: PLANT I.D. # _____

PDF # _____ PERMIT WRITER: _____

1. NAME OF APPLICANT (AS REGISTERED WITH THE WV SECRETARY OF STATE'S OFFICE):

CNX Gas Company LLC

2. NAME OF FACILITY (IF DIFFERENT FROM ABOVE):

Eckman Compressor Station

3. NORTH AMERICAN INDUSTRY
CLASSIFICATION SYSTEM (NAICS)
CODE:

211111

4A. MAILING ADDRESS:

627 Claypool Hill Mall Rd., Cedar Bluff, VA 24069

4B. PHYSICAL ADDRESS:

Eureka Hollow Road, Eckman, WV

5A. DIRECTIONS TO FACILITY (PLEASE PROVIDE MAP AS ATTACHMENT A): **From Bluewell at the intersection of Rt. 20 and 52 N, go straight on 52 N 16 miles to the Eckman Bridge then turn right. Go under overpass and across railroad tracks (~1 mile). There will be a green gate on the right. Go through gate and proceed to top of hill.**

5B. NEAREST ROAD:

Rt. 52

5C. NEAREST CITY OR TOWN:

Eckman, WV

5D. COUNTY:

McDowell

5E. UTM NORTHING (KM):

4138.329

5F. UTM EASTING (KM):

459.355

5G. UTM ZONE:

NAD83 zone 17N

6A. INDIVIDUAL TO CONTACT IF MORE INFORMATION IS REQUIRED:

Kevin Elkins

6B. TITLE:

**Operations Manager - Central
Appalachia**

6C. TELEPHONE:

276-596-5018

6D. FAX:

6E. E-MAIL:

kevinelkins@consolenergy.com

7A. DAQ PLANT I.D. NO. (FOR AN EXISTING FACILITY ONLY):

7B. PLEASE LIST ALL CURRENT 45CSR13, 45CSR14, 45CSR19
AND/OR TITLE V (45CSR30) PERMIT NUMBERS ASSOCIATED
WITH THIS PROCESS (FOR AN EXISTING FACILITY ONLY):

N/A

7C. IS THIS PDF BEING SUBMITTED AS THE RESULT OF AN ENFORCEMENT ACTION? IF YES, PLEASE LIST:

8A. TYPE OF EMISSION SOURCE (CHECK ONE):

☐ NEW SOURCE

☐ ADMINISTRATIVE UPDATE

☐ MODIFICATION

☒ OTHER (PLEASE EXPLAIN IN 11B)

8B. IF ADMINISTRATIVE UPDATE, DOES DAQ HAVE THE
APPLICANT'S CONSENT TO UPDATE THE EXISTING
PERMIT WITH THE INFORMATION CONTAINED HEREIN?

☐ YES

☐ NO

9. IS DEMOLITION OR PHYSICAL RENOVATION AT AN EXISTING FACILITY INVOLVED?

☒ YES

☐ NO

10A. DATE OF ANTICIPATED INSTALLATION OR CHANGE:

As soon as approved

10B. DATE OF ANTICIPATED START-UP:

As soon as approved

11A. PLEASE PROVIDE A DETAILED PROCESS FLOW DIAGRAM SHOWING EACH PROPOSED OR MODIFIED PROCESS EMISSION POINT AS ATTACHMENT B.

11B. PLEASE PROVIDE A DETAILED PROCESS DESCRIPTION AS ATTACHMENT C.

12. PLEASE PROVIDE MATERIAL SAFETY DATA SHEETS (MSDS) FOR ALL MATERIALS PROCESSED, USED OR PRODUCED AS ATTACHMENT D. FOR CHEMICAL PROCESSES; PLEASE PROVIDE A MSDS FOR EACH COMPOUND EMITTED TO AIR.

Permit Determination Form

13A. REGULATED AIR POLLUTANT EMISSIONS:

⇒ **FOR A NEW FACILITY**, PLEASE PROVIDE PLANT WIDE EMISSIONS BASED ON THE POTENTIAL TO EMIT (PTE) FOR THE FOLLOWING AIR POLLUTANTS INCLUDING ALL PROCESSES.

⇒ **FOR AN EXISTING FACILITY**, PLEASE PROVIDE THE PROPOSED CHANGE IN EMISSIONS BASED ON THE PTE OF ALL PROCESS CHANGES FOR THE FOLLOWING AIR POLLUTANTS.

PTE FOR A GIVEN POLLUTANT IS TYPICALLY BEFORE AIR POLLUTION CONTROL DEVICES AND IS COLLECTED BASED ON THE MAXIMUM DESIGN CAPACITY OF PROCESS EQUIPMENT.

POLLUTANT	HOURLY PTE (LB/HR)	YEARLY PTE (TON/YR) (HOURLY PTE MULTIPLIED BY 8760 HR/YR) DIVIDED BY 2000 LB/TON
PM	0.010	0.044
PM ₁₀	0.010	0.044
VOCs	0.146	0.642
CO	0.209	0.917
NO _x	0.105	0.458
SO ₂	0.0005	0.0023
Pb	0	0
HAPs (AGGREGATE AMOUNT)	0.046	0.202
TAPs (INDIVIDUALLY)*		
OTHER (INDIVIDUALLY)*		

* ATTACH ADDITIONAL PAGES AS NEEDED

13B. PLEASE PROVIDE ALL SUPPORTING CALCULATIONS AS ATTACHMENT E.

CALCULATE AN HOURLY AND YEARLY PTE OF EACH PROCESS EMISSION POINT (SHOWN IN YOUR DETAILED PROCESS FLOW DIAGRAM) FOR ALL AIR POLLUTANTS LISTED ABOVE INCLUDING INDIVIDUAL HAP'S (LISTED IN SECTION 112[b] OF THE 1990 CAAA), TAP'S (LISTED IN 45CSR27), AND OTHER AIR POLLUTANTS (E.G. POLLUTANTS LISTED IN TABLE 45-13A OF 45CSR13, MINERAL ACIDS PER 45CSR7, ETC.).

14. CERTIFICATION OF DATA

I, **KEVIN ELKINS** (TYPE NAME) ATTEST THAT ALL THE REPRESENTATIONS CONTAINED IN THIS APPLICATION, OR APPENDED HERETO, ARE TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE BASED ON INFORMATION AND BELIEF AFTER REASONABLE INQUIRY, AND THAT I AM A **RESPONSIBLE OFFICIAL**** (PRESIDENT, VICE PRESIDENT, SECRETARY OR TREASURER, GENERAL PARTNER OR SOLE PROPRIETOR) OF THE APPLICANT.

SIGNATURE OF RESPONSIBLE OFFICIAL: 

TITLE: **Operations Manager – Central Appalachia** DATE: 1 / 23 / 2017

**THE DEFINITION OF THE PHRASE 'RESPONSIBLE OFFICIAL' CAN BE FOUND AT 45CSR13, SECTION 2.23.

NOTE: PLEASE CHECK ENCLOSED ATTACHMENTS:

☒ ATTACHMENT A ☒ ATTACHMENT B ☒ ATTACHMENT C ☐ ATTACHMENT D ☒ ATTACHMENT E

RECORDS ON ALL CHANGES ARE REQUIRED TO BE KEPT AND MAINTAINED ON-SITE FOR TWO (2) YEARS.

THE PERMIT DETERMINATION FORM WITH THE INSTRUCTIONS CAN BE FOUND ON DAQ'S PERMITTING SECTION WEB SITE:

www.dep.wv.gov/daq

ATTACHMENT A

Map



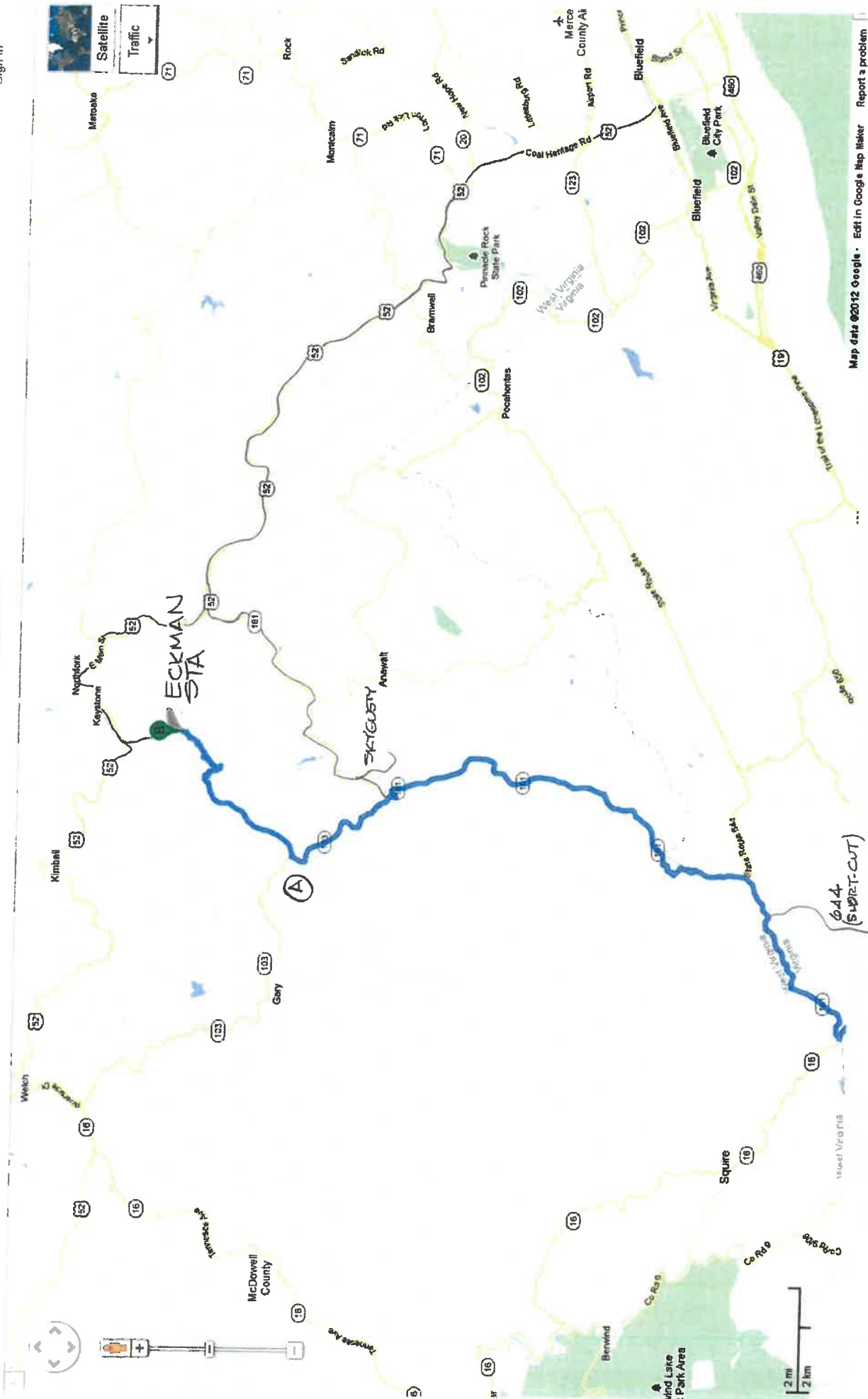
©2010 Google

Elevat 845ft

© 2013 Google
Image USDA Farm Service Agency

37°22'27.27"N 81°27'42.77"W elev 2235ft

Map Date 7-2-2011 1996

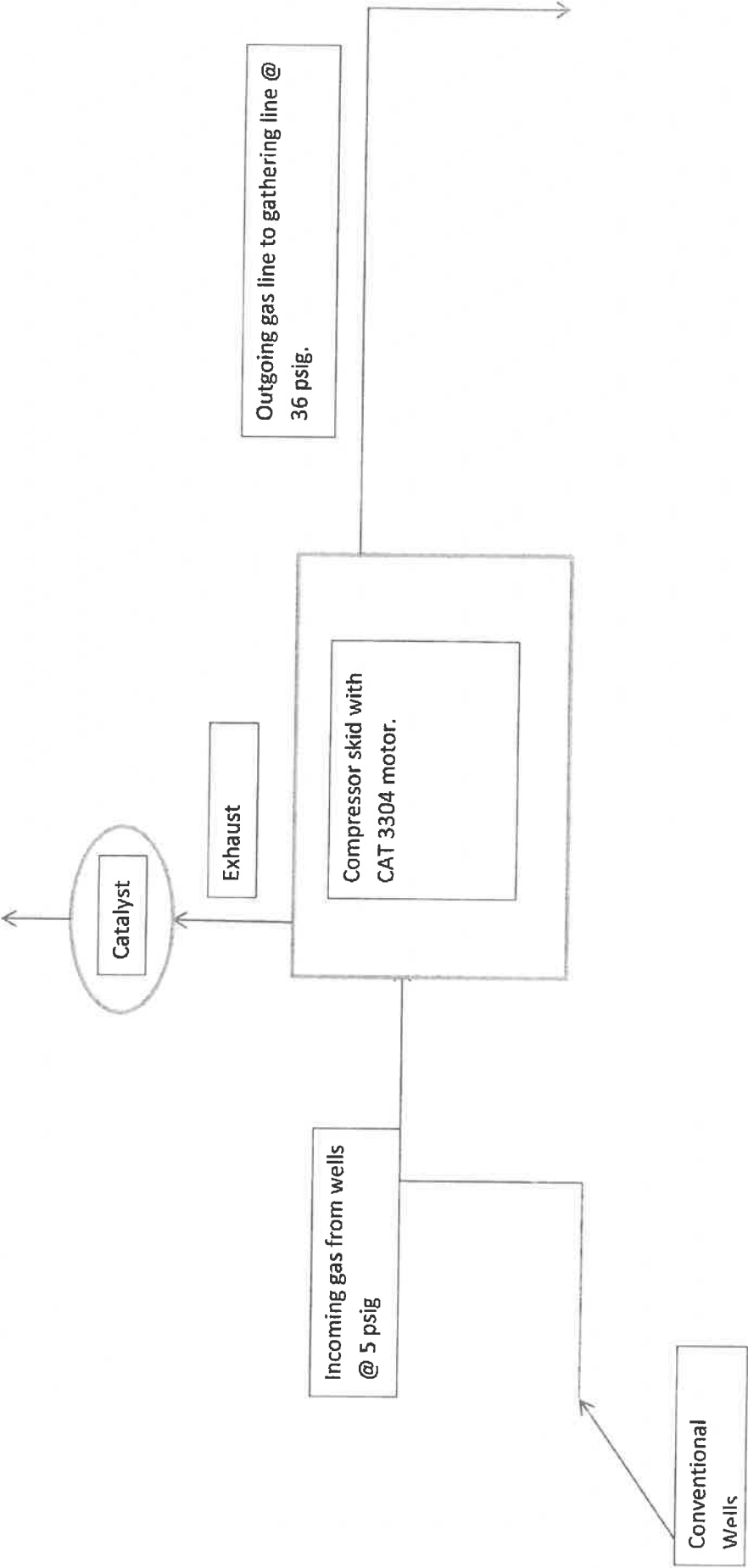


ECKMAN STA FR TAZEWELL (EXT 1)
RT 16/101/103

37° 23' 27.5" N
 81° 27' 33.5" W

ATTACHMENT B
Detailed Process Flow Diagram

Attachment B: Process flow diagram



ATTACHMENT C
Detailed Process Description

Attachment C: Process Description

CNX Gas Company LLC (CNX) is requesting a permit determination for moving an existing engine, a Caterpillar G3304 NA (95 BHP @ 1,800 RPM) natural gas fired compressor engine, from the Big Four Compressor Station (Big Four) located in McDowell County, West Virginia (Plant ID No. 047-00140) to the Eckman Compressor Station (Eckman) located in McDowell County, West Virginia.

On December 6, 2012, it was determined by WVDEP that a permit would not be required for the installation and operation of the engine noted above. That determination, along with the corresponding Request for Determination are provided in Appendix 1.

CNX is requesting a determination on whether a permit is required for this same engine to be moved from Big Four to Eckman.

ATTACHMENT E
Supporting Calculations

GRI-HAPCalc® 3.0
Engines Report

Facility ID:	BIG FOUR	Notes:	CNX Gas LLC
Operation Type:	GAS PLANT		Big Four Compressor Station
Facility Name:	BIG FOUR COMPRESSOR STATION		ARG-330 Engine
User Name:	David Morris		
Units of Measure:	U.S. STANDARD		

*Note: Emissions less than 5.00E-09 tons (or tonnes) per year are considered insignificant and are treated as zero.
These emissions are indicated on the report with a "0".
Emissions between 5.00E-09 and 5.00E-05 tons (or tonnes) per year are represented on the report with "0.0000".*

Engine Unit

Unit Name: ENGINE 1

Hours of Operation: 8,760 Yearly
Rate Power: 95 hp
Fuel Type: NATURAL GAS
Engine Type: 4-Stroke, Rich Burn
Emission Factor Set: EPA
Additional EF Set: 0.5NOX 1 CO 0.7 VOC

Calculated Emissions (ton/yr)

<u>Chemical Name</u>	<u>Emissions</u>	<u>Emission Factor</u>	<u>Emission Factor Set</u>
HAPs			
Formaldehyde	0.1206	0.13154200 g/bhp-hr	EPA
Methanol	0.0108	0.01179340 g/bhp-hr	EPA
Acetaldehyde	0.0162	0.01769010 g/bhp-hr	EPA
Acrolein	0.0100	0.01088620 g/bhp-hr	EPA
Benzene	0.0287	0.03129790 g/bhp-hr	EPA
Toluene	0.0091	0.00997900 g/bhp-hr	EPA
Ethylbenzene	0.0002	0.00024040 g/bhp-hr	EPA
Xylenes(m,p,o)	0.0026	0.00281230 g/bhp-hr	EPA
Styrene	0.0002	0.00018600 g/bhp-hr	EPA
Naphthalene	0.0008	0.00086180 g/bhp-hr	EPA
Ethylene Dibromide	0.0003	0.00033110 g/bhp-hr	EPA
Vinyl Chloride	0.0001	0.00011340 g/bhp-hr	EPA
Methylene Chloride	0.0007	0.00072570 g/bhp-hr	EPA
1,1-Dichloroethane	0.0002	0.00017690 g/bhp-hr	EPA
1,3-Dichloropropene	0.0002	0.00019960 g/bhp-hr	EPA
Chlorobenzene	0.0002	0.00019960 g/bhp-hr	EPA
Chloroform	0.0002	0.00021320 g/bhp-hr	EPA
1,1,2-Trichloroethane	0.0002	0.00019050 g/bhp-hr	EPA
1,1,2,2-Tetrachloroethane	0.0003	0.00029940 g/bhp-hr	EPA
Carbon Tetrachloride	0.0003	0.00027670 g/bhp-hr	EPA
Total	0.2019		

Criteria Pollutants

PM	0.0407	0.04445210 g/bhp-hr	EPA
CO	0.9165	1.00000000 g/bhp-hr	0.5NOX 1 CO 0.7 VOC
NMEHC	0.6416	0.70000000 g/bhp-hr	0.5NOX 1 CO 0.7 VOC
NOx	0.4583	0.50000000 g/bhp-hr	0.5NOX 1 CO 0.7 VOC
SO2	0.0023	0.00249480 g/bhp-hr	EPA

Other Pollutants

Methane	1.1640	1.27006040 g/bhp-hr	EPA
Butyraldehyde	0.0002	0.00016780 g/bhp-hr	EPA
1,2-Dichloroethane	0.0002	0.00017690 g/bhp-hr	EPA
1,2-Dichloropropane	0.0002	0.00019960 g/bhp-hr	EPA
CO2	457.2997	498.95230000 g/bhp-hr	EPA



JANUARY 2000

**G3300 GAS
INDUSTRIAL**

**ENGINE
PERFORMANCE**

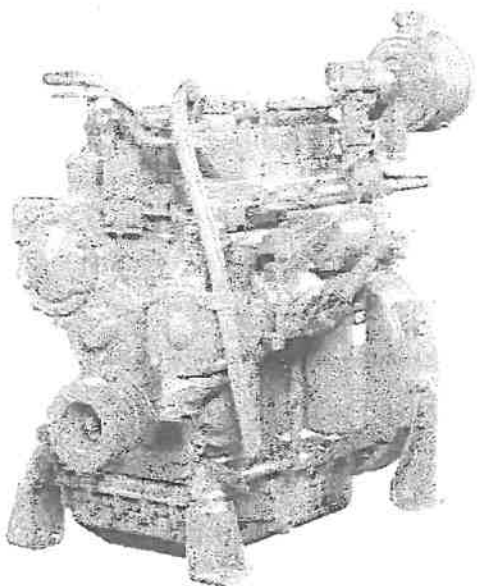
CATERPILLAR ENGINE DIVISION

CATERPILLAR

Gas Industrial Engines

G3304

41-95 hp
900-1800 rpm



SPECIFICATIONS

In-Line 4, 4-Stroke-Cycle
Bore—in (mm)..... 4.75 (121)
Stroke—in (mm)..... 6.0 (152)
Displacement—cu in (L)..... 425 (7.0)
Rotation (from flywheel end) Counterclockwise
Compression Ratios 10.5:1 or 8:1
Aspiration..... Naturally Aspirated
Speed Range 900-1800 rpm
Cooling System—gal (L) 4.2 (15.9)
Lube Oil System—gal (L)..... 5.0 (18.9)
Weight, Net Dry (approx)—lb (kg) 1630 (739)



FEATURES

■ DIESEL STRENGTH BUILT IN

Blocks, crankshafts, heads, liners, and connecting rods are common with Cat Diesel Engines. Gas engine pressures are 40% to 50% lower. Result... extra long life.

■ SIMPLICITY

Time proven solid state magnetos provide ignition power without the need for belt driven alternators and batteries.

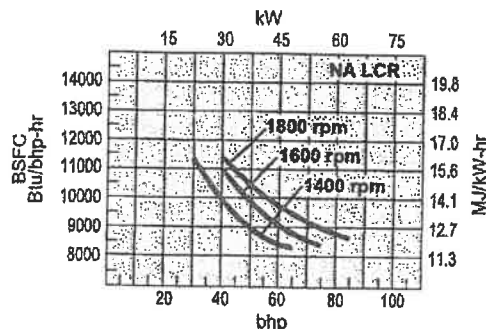
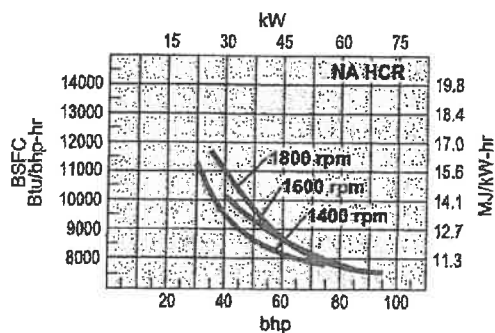
■ APPLICATION FLEXIBILITY

Constant torque over a wide speed range offers more flexibility for matching engine power output to job needs.

■ DURABILITY

Gas engine exhaust temperatures are higher than diesel. Watercooled exhaust manifolds provide longer life because they operate at lower temperatures, resulting in fewer cracks and less warpage.

FUEL CONSUMPTION



G3304

Engine Speed (rpm)	1800	Fuel	NAT GAS
Compression Ratio	10.5:1	LHV of Fuel (Btu/SCF)	920
Aftercooler Inlet Temperature (°F)	N/A	Fuel System	LPG IMPCO
Jacket Water Outlet Temperature (°F)	210		
Ignition System	MAG	Minimum Fuel Pressure (psig)	1.5
Exhaust Manifold	WATER COOLED	Methane Number at Conditions Shown	80
Combustion System Type	STANDARD	Rated Altitude (ft)	500

at 77°F Design Temperature

Engine Rating Data

Engine Power (w/o fan)

% Load	100%	75%	50%
bhp	95	71	48

Engine Data

Specific Fuel Consumption (BSFC) (1)	Btu/bhp-hr	7640	7917	10073
Air Flow (Wet, @77°F, 28.8 in Hg)	lb/hr	666	533	414
Air Mass Flow (Wet)	scfm	145	116	90
Compressor Out Pressure	N/A	N/A	N/A	N/A
Compressor Out Temperature	N/A	N/A	N/A	N/A
Inlet Manifold Pressure	in. Hg (abs)	27.5	23.5	19.4
Inlet Manifold Temperature (10)	°F	100	100	131
Timing (11)	°BTDC	30	30	30
Exhaust Stack Temperature	°F	1045	1004	988
Exhaust Gas Flow (Wet, @ stack temperature, 29.7 in Hg)	CFM	461	351	276
Exhaust Gas Mass Flow (Wet)	lb/hr	702	561	438

Engine Emissions Data

Nitrous Oxides (NOx as NO2) (9)	(Corr. 15% O2)	g/bhp-hr	15.8	16.8	19.7
		ppm	1174	1161	1086
Carbon Monoxide (CO) (9)	(Corr. 15% O2)	g/bhp-hr	1.6	1.7	1.8
		ppm	201	191	160
Total Hydrocarbons (THC) (9)	(Corr. 15% O2)	g/bhp-hr	2.4	2.4	3.2
		ppm	520	473	519
Non-Methane Hydrocarbons (NMHC) (9)	(Corr. 15% O2)	g/bhp-hr	0.36	0.36	0.48
		ppm	78	71	78
Exhaust Oxygen (9)		%	3.1	2.9	1.7
Lambda			1.17	1.18	1.10

Engine Heat Balance Data

Input Energy LHV (1)	Btu/min	12097	9401	7974
Work Output	Btu/min	4029	3022	2014
Heat Rejection to Jacket (2) (6)	Btu/min	4344	3502	3634
Heat Rejection to Atmosphere (Radiated) (4)	Btu/min	484	376	319
Heat Rejection to Lube Oil (5)	Btu/min	0	0	0
Total Heat Rejection to Exhaust (to 77°F) (2)	Btu/min	3106	2369	1826
Heat Rejection to Exhaust (LHV to 350°F) (2)	Btu/min	2259	1693	1295
Heat Rejection to Aftercooler (3) (7) (8)	N/A	N/A	N/A	N/A

Engine Noise Data - at 100% load

Noise - Mechanical @ 1 m	93 dB(A)
Noise - Exhaust @ 1.5 m	106 dB(A)

Fuel Usage Guide

Derate Factor / Engine Timing vs Methane Number

<30	30	35	40	45	50	55	60	65	70	75	80 to 100
0	1.0/15	1.0/16	1.0/17	1.0/20	1.0/21	1.0/22	1.0/23	1.0/25	1.0/26	1.0/27	1.0/30

Altitude Deration Factors

AIR INLET TEMP. (°F)	130	120	110	100	90	80	70	60	50	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
	0.93	0.89	0.86	0.83	0.80	0.77	0.74	0.71	0.69	0.66	0.64	0.61	0.59									
	0.94	0.91	0.88	0.84	0.81	0.78	0.76	0.73	0.70	0.67	0.65	0.62	0.60									
	0.96	0.93	0.89	0.86	0.83	0.80	0.77	0.74	0.71	0.69	0.66	0.63	0.61									
	0.98	0.94	0.91	0.88	0.84	0.81	0.78	0.75	0.73	0.70	0.67	0.65	0.62									
	0.99	0.96	0.92	0.89	0.86	0.83	0.80	0.77	0.74	0.71	0.68	0.66	0.63									
	1.00	0.98	0.94	0.91	0.87	0.84	0.81	0.78	0.75	0.72	0.70	0.67	0.64									
	1.00	0.99	0.96	0.92	0.89	0.86	0.83	0.80	0.77	0.74	0.71	0.68	0.66									
	1.00	1.00	0.98	0.94	0.91	0.87	0.84	0.81	0.78	0.75	0.72	0.70	0.67									
	1.00	1.00	1.00	0.96	0.93	0.89	0.86	0.83	0.80	0.77	0.74	0.71	0.68									

ALTITUDE (FEET ABOVE SEA LEVEL)

Aftercooler Heat Rejection Factors

AIR INLET TEMP. (°F)	130	120	110	100	90	80	70	60	50	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

ALTITUDE (FEET ABOVE SEA LEVEL)

TM9744-02 Data is intended to be used with Gas Engine Performance Book Parameters - DM5901-00 on page 8

G3304 NA**GAS ENGINE TECHNICAL DATA****CATERPILLAR®**

ENGINE SPEED:	1800	FUEL:	NAT GAS
COMPRESSION RATIO:	10.5:1	FUEL SYSTEM:	LPG IMPCO
AFTERCOOLER (°F):	N/A	MIN. FUEL PRESS. (psig):	1.5
JACKET WATER (°F):	210	MIN. METHANE NUMBER:	80
COOLING SYSTEM:	COMBINED	MAX. RATED ALTITUDE (ft):	500
IGNITION SYSTEM:	MAG	AT AMBIENT TEMP (°F):	77
EXHAUST MANIFOLD:	WET	NOx EMISSION LEVEL:	STD
COMBUSTION:	STD		

RATING AND EFFICIENCY	NOTES	LOAD	100%	75%	50%
LHV OF FUEL		btu/scf	920	920	920
ENGINE POWER		bhp	95	71	48
ENGINE EFFICIENCY	(1)	%	33.3	32.1	25.3
THERMAL EFFICIENCY	(5)	%	54.6	55.3	61.8
TOTAL EFFICIENCY	(6)	%	87.9	87.4	87.1

ENGINE DATA					
FUEL CONSUMPTION	(1)	btu/bhp-hr	7640	7917	10073
AIR FLOW	(WET)	lb/hr	666	533	414
AIR FLOW	(WET)	scfm	145	116	90
INLET MAN. PRESS.		in. Hg (abs)	27.5	23.5	19.4
INLET MAN. TEMP.	(10)	°F	100	100	131
TIMING	(11)	°BTDC	30	30	30
EXHAUST STACK TEMP.		°F	1045	1004	988
EXHAUST FLOW (@STACK TEMP)	(WET)	cfm	461	361	276
EXHAUST FLOW	(WET)	lb/hr	702	561	438

EMISSIONS					
NOx (as NO2)	(9)	g/bhp-hr	15.8	16.8	19.7
CO	(9)	g/bhp-hr	1.6	1.7	1.8
THC	(9)	g/bhp-hr	2.4	2.4	3.2
NMHC	(9)	g/bhp-hr	0.36	0.36	0.48
EXHAUST O2 (DRY)		%	3.1	2.9	1.7
LAMBDA			1.17	1.18	1.10

HEAT BALANCE DATA					
LHV INPUT	(1)	btu/min	12097	9401	7974
HEAT REJ. TO JACKET	(2) (7)	btu/min	4344	3502	3634
HEAT REJ. TO ATMOSPHERE	(4)	btu/min	484	376	319
HEAT REJ. TO EXH. (LHV to 77°F)	(2)	btu/min	3106	2369	1826
HEAT REJ. TO EXH. (LHV to 350°F)	(2)	btu/min	2259	1693	1295

CONDITIONS AND DEFINITIONS

ENGINE RATING OBTAINED AND PRESENTED IN ACCORDANCE WITH ISO 3046/1 (STD. REF. CONDITIONS OF 25°C, 100 KPA). NO OVERLOAD PERMITTED AT RATING SHOWN. CONSULT ALTITUDE CURVES FOR APPLICATIONS ABOVE MAXIMUM RATED ALTITUDE AND/OR TEMPERATURE.

- 1) FUEL CONSUMPTION TOLERANCE ACCORDING TO ISO 3046/1. TOLERANCE IS +5% OF FULL LOAD DATA.
- 2) HEAT REJECTION TO JACKET AND EXHAUST TOLERANCE IS ±8% OF FULL LOAD DATA.
- 3) HEAT REJECTION TO A/C TOLERANCE IS ±8% OF FULL LOAD DATA.
- 4) HEAT REJECTION TO ATMOSPHERE TOLERANCE IS ±25% OF FULL LOAD DATA.
- 5) THERMAL EFFICIENCY: JACKET WATER + EXH. HEAT TO 350°F
- 6) TOTAL EFFICIENCY: ENGINE EFF. + THERMAL EFF. TOLERANCE IS ±10% OF FULL LOAD DATA
- 7) TOTAL JW HEAT: JACKET HEAT + OIL COOLER HEAT (HEAT RATE BASED ON TREATED WATER)
- 8) TOTAL A/C HEAT: A/C HEAT x A/C HEAT REJ. FACTOR (HEAT RATE BASED ON TREATED WATER)
- 9) EMISSION DATA SHOWN ARE NOT TO EXCEED VALUES. PUBLISHED PART LOAD DATA MAY REQUIRE ENGINE ADJUSTMENT.
- 10) MEASURED BETWEEN AFTERCOOLER OUTLET AND PLENUM ENTRY.
- 11) TIMING INDICATED IS FOR USE WITH A MINIMUM FUEL METHANE NUMBER SPECIFIED. CONSULT THE APPROPRIATE FUEL USAGE GUIDE FOR TIMING AT OTHER METHANE NUMBERS.

FUEL USAGE GUIDE

DERATE FACTOR/ENGINE TIMING vs METHANE NUMBER											
<30	30	35	40	45	50	55	60	65	70	75	80 to 100
0	1.0/15	1.0/16	1.0/17	1.0/20	1.0/21	1.0/22	1.0/23	1.0/25	1.0/26	1.0/27	1.0/30

ALTITUDE DERATION FACTORS

A	130	0.93	0.89	0.86	0.83	0.80	0.77	0.74	0.71	0.69	0.66	0.64	0.61	0.59
M	120	0.94	0.91	0.88	0.84	0.81	0.78	0.76	0.73	0.70	0.67	0.65	0.62	0.60
B	110	0.96	0.93	0.89	0.86	0.83	0.80	0.77	0.74	0.71	0.69	0.66	0.63	0.61
I	100	0.98	0.94	0.91	0.88	0.84	0.81	0.78	0.75	0.73	0.70	0.67	0.65	0.62
E	90	0.99	0.96	0.92	0.89	0.86	0.83	0.80	0.77	0.74	0.71	0.68	0.66	0.63
N	80	1.00	0.98	0.94	0.91	0.87	0.84	0.81	0.78	0.75	0.72	0.70	0.67	0.64
T	70	1.00	0.99	0.96	0.92	0.89	0.86	0.83	0.80	0.77	0.74	0.71	0.68	0.66
	60	1.00	1.00	0.98	0.94	0.91	0.87	0.84	0.81	0.78	0.75	0.72	0.70	0.67
(°F)	50	1.00	1.00	1.00	0.96	0.93	0.89	0.86	0.83	0.80	0.77	0.74	0.71	0.68
	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000	
ALTITUDE (FEET ABOVE SEA LEVEL)														

FUEL USAGE GUIDE:

This table shows the derate factor required for a given fuel and what engine timing to use. Note that deration occurs as the methane number decreases. Methane number is a scale to measure ignition and burning characteristics of various fuels. Representative values are shown below.

Methane	100
Ethane	44
Propane	34
n-Butane	10
Hydrogen	0

Most dry pipeline natural gas has a methane number of 67 or above. The gas quality should be analyzed to determine the percentage of each constituent and then determine the methane number. Consult the dealer or factory for assistance.

ALTITUDE DERATION FACTORS:

This table shows the deration required for various ambient temperatures and altitudes. Use this information to help determine actual engine power for your site.

ACTUAL ENGINE RATING:

It is important to note that the Altitude/Temperature deration and the Fuel Usage Guide deration are not cumulative, i.e., they are not to be added together. The same is true for the Low Energy Fuel deration (reference the Caterpillar Methane Number Program) and the Fuel Usage Guide deration. However, the Altitude/Temperature deration and Low Energy Fuel deration are cumulative; and they must be added together in the method shown below. To determine the actual power available, take the lowest rating between 1) and 2).

- 1) (Altitude/Temperature Deration) + (Low Energy Fuel Deration)
- 2) Fuel Usage Guide Deration

Note: For NA's always add the Low Energy Fuel deration to the Altitude/Temperature deration. For TA engines only add the Low Energy Fuel deration to the Altitude/Temperature deration whenever the Altitude/Temperature deration is less than 1.0 (100%). This will give the actual rating for the engine at the conditions specified.

AFTERCOOLER HEAT REJECTION FACTORS:

Aftercooler heat rejection is given for standard conditions of 77°F and 500 ft altitude. To maintain a constant inlet air manifold temperature, as the ambient air temperature goes up, so must the heat rejection. As altitude increases, the turbocharger must work harder to overcome the lower atmospheric pressure. This increases the amount of heat that must be removed from the inlet air by the aftercooler. Use the aftercooler heat rejection factor to adjust for ambient and altitude conditions. Multiply this factor by the standard aftercooler heat rejection. Failure to properly account for these factors could result in detonation and cause the engine to shut down or fail.

Cat 3304NA CNX 3460MD Spec sheet

ENGINE DATA Engine	Cat 3304NA
Power	95 hp (assumed)
Fuel	PQNG
Exhaust Flow	454 acfm (assumed)
CATALYST SYSTEM	DC48-4 HGS
DATA Catalyst Model	
Catalyst Type	3 way
Number of Elements	1
Cell Density	300 cpsi
Approx. Dimensions	See Attached Drawing
Connection Size	4"
Approx Weight	124 lbs
Approx. Pressure Drop	<8.0" w.c

EMISSION REQUIREMENTS Exhaust Gas Component	Engine Output (g/bhp-hr)	Converter Output (g/bhp-hr)
NOx	12	0.5
CO	12	1
VOC	1	0.7

ENGINE TEST [N4F02193]**JULY 07, 2006**Can't find what you're looking for? [Click here](#)**Sales Model:** 3304**Built Date:** 07Apr2006**Tested Date:** 08Apr2006**Shipped Date:** 18Apr2006**Tested: @****Plant:** Lafayette**Test Number:** 01**Cell Number:** 11

Test Element	Test Value	Spec Value	Label
Spec Number	0K4483	0K4483	
Arrangement Number	2229043	2229043	
CORR FL PWR	95	95	HP
Speed	1,799	1,800	RPM
CORR FL FUEL RATE	11,890.6	12,122.6	BTU/MIN
CSFC	7,493	7,640	BTU/HP-H
Jacket Water Temp	189	192	F
IN SCAC H2O	66		F
Compressor Out Pressure	14.21		PSIA
Inlet Manifold Pressure	13.20	13.34	PSIA
Excess Oxygen	3.2	3.1	%
Nox Level			PPM
FL Oil Press	77	76	PSI
High Speed	1,905	1,926	RPM
Diff Fuel Pressure High	0.22	0.22	PSI
Low Idle Speed	902	900	RPM
Low Idle Oil Pressure	60	58	PSI
Fuel Pressure	18	18	PSIA
Timing BTDC			DEG

Caterpillar Confidential: **Green**

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Current Date: Friday, July 07, 2006 8:44:22 AM

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APPENDIX 1

Big Four Engine Information



west virginia department of environmental protection

Division of Air Quality
601 57th Street, S.E.
Charleston, WV 25304

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

December 6, 2012

David Morris
Air Quality Manager
CNX Gas, LLC
1000 Consol Energy Drive
Canonsburg, PA 15321-6506

Re: Permit Applicability Determination
Big Four Compressor Station
McDowell County, WV
Determination No. PD12-101
Plant ID No. 047-00140

Dear Mr. Morris:

It has been determined that a permit will not be required for the installation and operation of one Caterpillar G3304 NA (95 BHP @ 1,800 RPM) natural gas fired compressor engine at the above referenced facility. This determination is based on information included with your Permit Determination Form (PDF) received on November 5, 2012, which indicates that the increase in emissions will not exceed two (2) lbs/hr or five (5) tons/year of total Hazardous Air Pollutants (HAPs); six (6) lbs/hour and ten (10) TPY of any regulated pollutant; or, trigger a substantive requirement of any State or Federal air quality regulation.

Please bear in mind, however, that any additional changes to the proposed facility, may require a permit under 45CSR13. Furthermore, pursuant to 45CSR13-5.14, records briefly describing the proposed change, the pollutants involved, the potential to emit for each pollutant increased or added shall be maintained by the owner or operator for at least two years and made available to the Director upon request.

Should you have any questions, please contact the undersigned engineer at (304) 926-0499 Ext. 1211.

Sincerely,

William T. Rothwell II, P.E.
Engineer



CONSOL Energy Inc.

CNX Center
1000 Consol Energy Drive
Canonsburg, PA 15321-6506

phone: 724/485-3063
fax: 724/485-4513
e-mail: DavidMorris@consolenergy.com
web: www.consolenergy.com

David Morris, EIT – Air Quality Manager

August 27, 2012

Regional Air Quality Manager
West Virginia Dept. of Environmental Protection
Division of Air Quality
601 57th Street, SE
Charleston, WV 25304

***RE: CNX Gas Company LLC Request for Determination
Big Four Gas Compressor Station***

Dear Sir or Madam:

Attached you will find a request for determination regarding CNX Gas Company's natural gas compressor station, hereto referred as Big Four. This is existing station that was exempt when installed. At this time CNX Gas proposes to switch the compressor engine at the facility as less compression is needed at this time. CNX Gas is hereby submitting this request for determination to the WVDEP.

This is a withdrawal of the previous submittal # PD12-084, and resubmittal with all the necessary information.

Big Four consists of a single 95 Horsepower, natural gas fired compressor engine with a three way catalyst, there are no other sources at the facility.

If you have any Questions regarding this request, feel free to contact me at 724-485-3063.

Sincerely,

A handwritten signature in blue ink that reads 'David Morris'.

David Morris, EIT
Air Quality Manager
CONSOL Energy

Certified Mail No. 7011 1570 0000 0308 6502
Return Receipt Requested



WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY
601 57th Street, SE
Charleston, WV 25304
Phone: (304) 926-0475
www.dep.wv.gov/daq

**PERMIT DETERMINATION FORM
(PDF)**

FOR AGENCY USE ONLY: PLANT I.D. # _____

PDF # _____ PERMIT WRITER: _____

1. NAME OF APPLICANT (AS REGISTERED WITH THE WV SECRETARY OF STATE'S OFFICE):

CNX Gas LLC

2. NAME OF FACILITY (IF DIFFERENT FROM ABOVE):

Big Four

3. NORTH AMERICAN INDUSTRY
CLASSIFICATION SYSTEM (NAICS)
CODE:

211111

4A. MAILING ADDRESS: 627 CLAYPOOL HILL MALL RD

Cedar Bluff, VA 24609

4B. PHYSICAL ADDRESS:

5A. DIRECTIONS TO FACILITY (PLEASE PROVIDE MAP AS ATTACHMENT A): 1. From Bluewell at the intersection of Rt. 20 and 52 N go straight on 52 N 21.5 miles. Take a left into Walmart parking lot then bare left at bottom of hill across railroad tracks, then left again into gravel road. Follow gravel road for 0.3 miles then bare right thru green gate, follow 0.3 miles then bare left thru yellow gate. Follow road 1.6

5B. NEAREST ROAD:

Route 52

5C. NEAREST CITY OR TOWN:

Kimball, WV

5D. COUNTY:

McDowell

5E. UTM NORTHING (KM):

4139.710

5F. UTM EASTING (KM):

456.287

5G. UTM ZONE:

NAD 83 17N

6A. INDIVIDUAL TO CONTACT IF MORE INFORMATION IS REQUIRED:

David Morris

6B. TITLE:

Air Quality Manager

6C. TELEPHONE:

724-485-3063

6D. FAX:

6E. E-MAIL:

DavidMorris@consolenergy.com

7A. DAQ PLANT I.D. NO. (FOR AN EXISTING FACILITY ONLY):

7B. PLEASE LIST ALL CURRENT 45CSR13, 45CSR14, 45CSR19
AND/OR TITLE V (45CSR30) PERMIT NUMBERS ASSOCIATED
WITH THIS PROCESS (FOR AN EXISTING FACILITY ONLY):

7C. IS THIS PDF BEING SUBMITTED AS THE RESULT OF AN ENFORCEMENT ACTION? IF YES, PLEASE LIST:

8A. TYPE OF EMISSION SOURCE (CHECK ONE):

☒ NEW SOURCE

☐ ADMINISTRATIVE UPDATE

☐ MODIFICATION

☐ OTHER (PLEASE EXPLAIN IN 11B)

8B. IF ADMINISTRATIVE UPDATE, DOES DAQ HAVE THE
APPLICANT'S CONSENT TO UPDATE THE EXISTING
PERMIT WITH THE INFORMATION CONTAINED HEREIN?

☐ YES

☐ NO

9. IS DEMOLITION OR PHYSICAL RENOVATION AT AN EXISTING FACILITY INVOLVED? ☐ YES ☒ NO

10A. DATE OF ANTICIPATED INSTALLATION OR CHANGE:

As soon as approved

10B. DATE OF ANTICIPATED START-UP:

As soon as approved

11A. PLEASE PROVIDE A DETAILED PROCESS FLOW DIAGRAM SHOWING EACH PROPOSED OR MODIFIED PROCESS EMISSION POINT AS ATTACHMENT B.

11B. PLEASE PROVIDE A DETAILED PROCESS DESCRIPTION AS ATTACHMENT C.

12. PLEASE PROVIDE MATERIAL SAFETY DATA SHEETS (MSDS) FOR ALL MATERIALS PROCESSED, USED OR PRODUCED AS ATTACHMENT D. FOR CHEMICAL PROCESSES, PLEASE PROVIDE A MSDS FOR EACH COMPOUND EMITTED TO AIR.

13A. REGULATED AIR POLLUTANT EMISSIONS:

⇒ **FOR A NEW FACILITY**, PLEASE PROVIDE PLANT WIDE EMISSIONS BASED ON THE POTENTIAL TO EMIT (PTE) FOR THE FOLLOWING AIR POLLUTANTS INCLUDING ALL PROCESSES.

⇒ **FOR AN EXISTING FACILITY**, PLEASE PROVIDE THE PROPOSED CHANGE IN EMISSIONS BASED ON THE PTE OF ALL PROCESS CHANGES FOR THE FOLLOWING AIR POLLUTANTS.

PTE FOR A GIVEN POLLUTANT IS TYPICALLY BEFORE AIR POLLUTION CONTROL DEVICES AND IS COLLECTED BASED ON THE MAXIMUM DESIGN CAPACITY OF PROCESS EQUIPMENT.

POLLUTANT	HOURLY PTE (LB/HR)	YEARLY PTE (TON/YR) (HOURLY PTE MULTIPLIED BY 8760 HR/YR) DIVIDED BY 2000 LB/TON
PM	0.010	0.044
PM ₁₀	0.010	0.044
VOCs	0.146	0.642
CO	0.209	0.917
NO _x	0.105	0.458
SO ₂	0.0005	0.0023
Pb	0	0
HAPs (AGGREGATE AMOUNT)	0.046	0.202
TAPs (INDIVIDUALLY)*		
OTHER (INDIVIDUALLY)*		

* ATTACH ADDITIONAL PAGES AS NEEDED

13B. PLEASE PROVIDE ALL SUPPORTING CALCULATIONS AS ATTACHMENT E.

CALCULATE AN HOURLY AND YEARLY PTE OF EACH PROCESS EMISSION POINT (SHOWN IN YOUR DETAILED PROCESS FLOW DIAGRAM) FOR ALL AIR POLLUTANTS LISTED ABOVE INCLUDING INDIVIDUAL HAP'S (LISTED IN SECTION 112(b) OF THE 1990 CAAA), TAP'S (LISTED IN 45CSR27), AND OTHER AIR POLLUTANTS (E.G. POLLUTANTS LISTED IN TABLE 45-13A OF 45CSR13, MINERAL ACIDS PER 45CSR7, ETC.).

14. CERTIFICATION OF DATA

I, DAVID MORRIS (TYPE NAME) ATTEST THAT ALL THE REPRESENTATIONS CONTAINED IN THIS APPLICATION, OR APPENDED HERETO, ARE TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE BASED ON INFORMATION AND BELIEF AFTER REASONABLE INQUIRY, AND THAT I AM A **RESPONSIBLE OFFICIAL**** (PRESIDENT, VICE PRESIDENT, SECRETARY OR TREASURER, GENERAL PARTNER OR SOLE PROPRIETOR) OF THE APPLICANT.

SIGNATURE OF RESPONSIBLE OFFICIAL: David Morris

TITLE: AIR QUALITY MANAGER

DATE: 11 / 2 / 12

**THE DEFINITION OF THE PHRASE 'RESPONSIBLE OFFICIAL' CAN BE FOUND AT 45CSR13, SECTION 2.23.

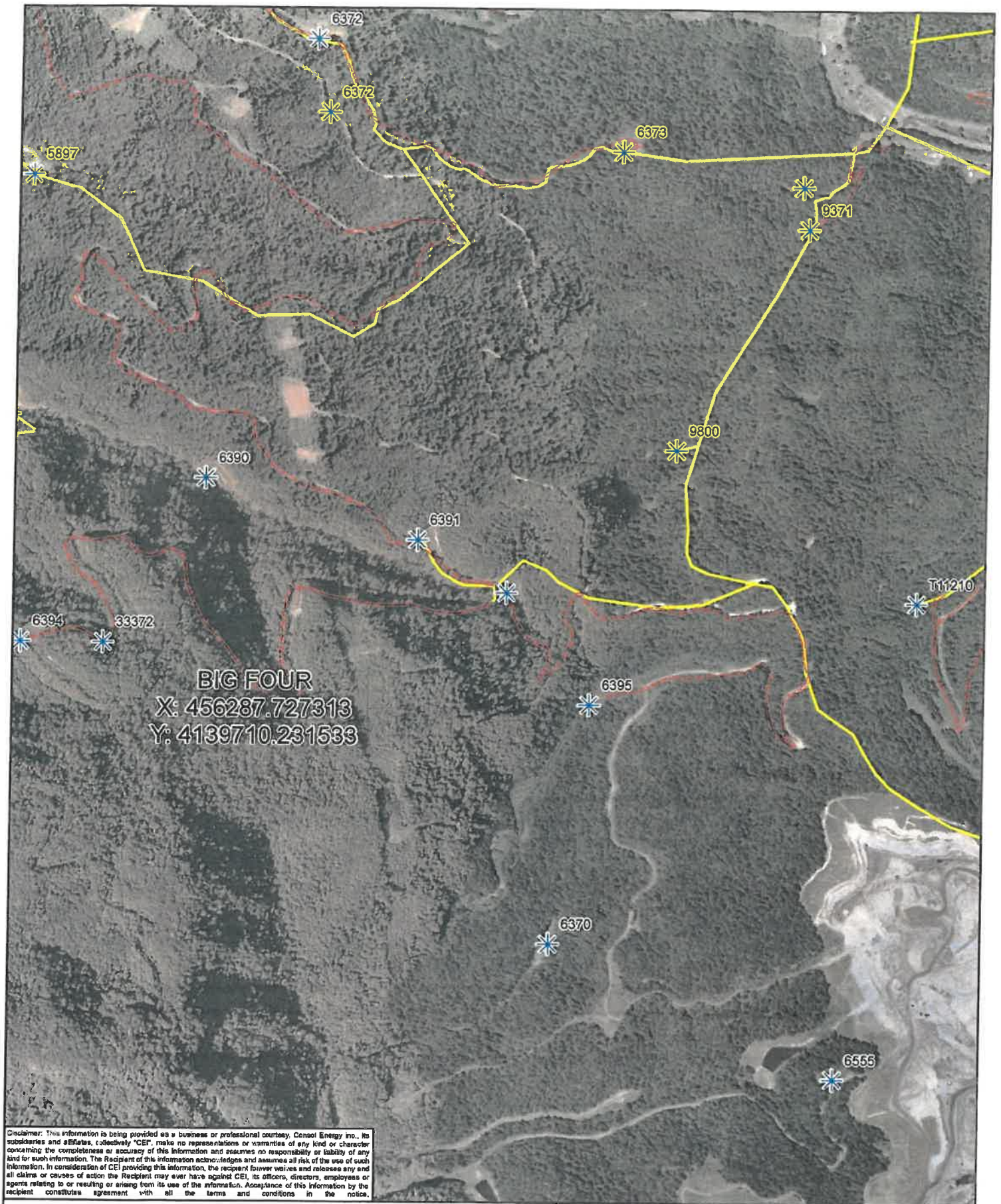
NOTE: PLEASE CHECK ENCLOSED ATTACHMENTS:

☒ ATTACHMENT A ☒ ATTACHMENT B ☒ ATTACHMENT C ☐ ATTACHMENT D ☒ ATTACHMENT E

RECORDS ON ALL CHANGES ARE REQUIRED TO BE KEPT AND MAINTAINED ON-SITE FOR TWO (2) YEARS.

THE PERMIT DETERMINATION FORM WITH THE INSTRUCTIONS CAN BE FOUND ON DAQ'S PERMITTING SECTION WEB SITE:

www.dep.wv.gov/daq



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1 Inch = 1,000 feet



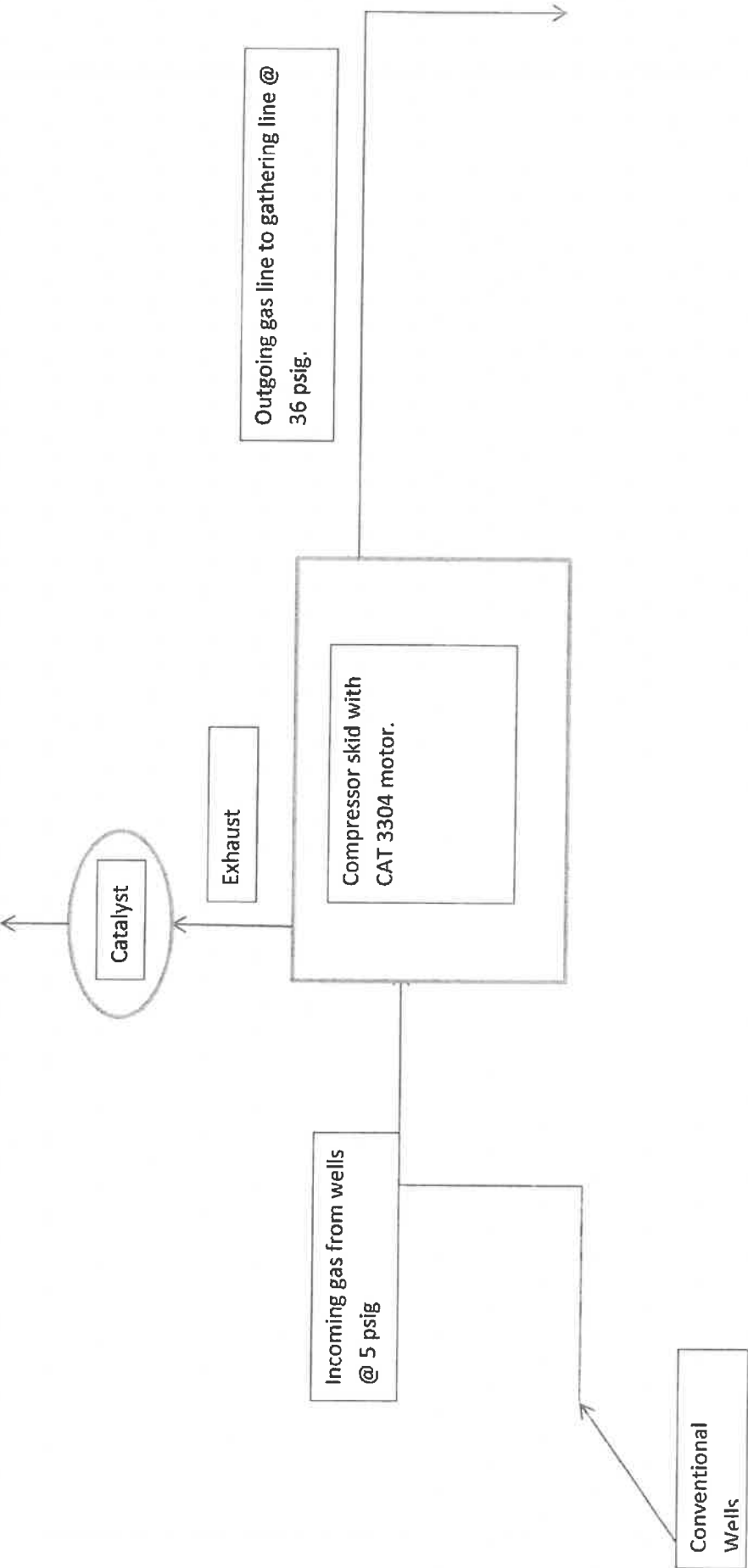
Date: 8/14/2012 Prepared By: Evan Currie

Revisions: 1 Approved By: Dave Miller

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**BIG FOUR
COMPRESSOR**

Attachment B: Process flow diagram



Attachment C: Process Description

Big Four station will draw incoming gas from nearby conventional wells at a suction pressure of 5 psig. The inlet gas is then compressed in one stage to increase the pressure to 36psig to exceed the pressure of the gathering line. The high pressure gas is then discharged out of the station through a pipeline connecting it to the nearby DTI transmission gathering pipeline. The site will process on average 400,000 SCF per day.

To control the engine emissions, a Catalytic Converter and Air Fuel Ratio Controller (AFRC) were installed. The Catalytic Converter is installed as part of the exhaust stream; therefore all post-combustion exhaust must pass through the catalyst element. There is NO exhaust bypass around the Catalytic Converter. In addition, the Catalytic Converter / AFRC package includes measurement of exhaust Oxygen levels; in addition to pre- and post-catalyst exhaust temperatures. If the Air-Fuel ratio drifts outside of its pre-determined range based on these measurements, the engine will shut down. The Air-Fuel ratio will then need to be reset before re-starting the engine.

GRI-HAPCalc® 3.0
Engines Report

Facility ID:	BIG FOUR	Notes:	CNX Gas LLC
Operation Type:	GAS PLANT		Big Four Compressor Station
Facility Name:	BIG FOUR COMPRESSOR STATION		ARG-330 Engine
User Name:	David Morris		
Units of Measure:	U.S. STANDARD		

*Note: Emissions less than 5.00E-09 tons (or tonnes) per year are considered insignificant and are treated as zero.
These emissions are indicated on the report with a "0".
Emissions between 5.00E-09 and 5.00E-05 tons (or tonnes) per year are represented on the report with "0.0000".*

Engine Unit

Unit Name: ENGINE 1

Hours of Operation: 8,760 Yearly
Rate Power: 95 hp
Fuel Type: NATURAL GAS
Engine Type: 4-Stroke, Rich Burn
Emission Factor Set: EPA
Additional EF Set: 0.5NOX 1 CO 0.7 VOC

Calculated Emissions (ton/yr)

<u>Chemical Name</u>	<u>Emissions</u>	<u>Emission Factor</u>	<u>Emission Factor Set</u>
HAPs			
Formaldehyde	0.1206	0.13154200 g/bhp-hr	EPA
Methanol	0.0108	0.01179340 g/bhp-hr	EPA
Acetaldehyde	0.0162	0.01769010 g/bhp-hr	EPA
Acrolein	0.0100	0.01088620 g/bhp-hr	EPA
Benzene	0.0287	0.03129790 g/bhp-hr	EPA
Toluene	0.0091	0.00997900 g/bhp-hr	EPA
Ethylbenzene	0.0002	0.00024040 g/bhp-hr	EPA
Xylenes(m,p,o)	0.0026	0.00281230 g/bhp-hr	EPA
Styrene	0.0002	0.00018600 g/bhp-hr	EPA
Naphthalene	0.0008	0.00086180 g/bhp-hr	EPA
Ethylene Dibromide	0.0003	0.00033110 g/bhp-hr	EPA
Vinyl Chloride	0.0001	0.00011340 g/bhp-hr	EPA
Methylene Chloride	0.0007	0.00072570 g/bhp-hr	EPA
1,1-Dichloroethane	0.0002	0.00017690 g/bhp-hr	EPA
1,3-Dichloropropene	0.0002	0.00019960 g/bhp-hr	EPA
Chlorobenzene	0.0002	0.00019960 g/bhp-hr	EPA
Chloroform	0.0002	0.00021320 g/bhp-hr	EPA
1,1,2-Trichloroethane	0.0002	0.00019050 g/bhp-hr	EPA
1,1,2,2-Tetrachloroethane	0.0003	0.00029940 g/bhp-hr	EPA
Carbon Tetrachloride	0.0003	0.00027670 g/bhp-hr	EPA
Total	0.2019		

Criteria Pollutants

PM	0.0407	0.04445210 g/bhp-hr	EPA
CO	0.9165	1.00000000 g/bhp-hr	0.5NOX 1 CO 0.7 VOC
NMEHC	0.6416	0.70000000 g/bhp-hr	0.5NOX 1 CO 0.7 VOC
NOx	0.4583	0.50000000 g/bhp-hr	0.5NOX 1 CO 0.7 VOC
SO2	0.0023	0.00249480 g/bhp-hr	EPA

Other Pollutants

Methane	1.1640	1.27006040 g/bhp-hr	EPA
Butyraldehyde	0.0002	0.00016780 g/bhp-hr	EPA
1,2-Dichloroethane	0.0002	0.00017690 g/bhp-hr	EPA
1,2-Dichloropropane	0.0002	0.00019960 g/bhp-hr	EPA
CO2	457.2997	498.95230000 g/bhp-hr	EPA

